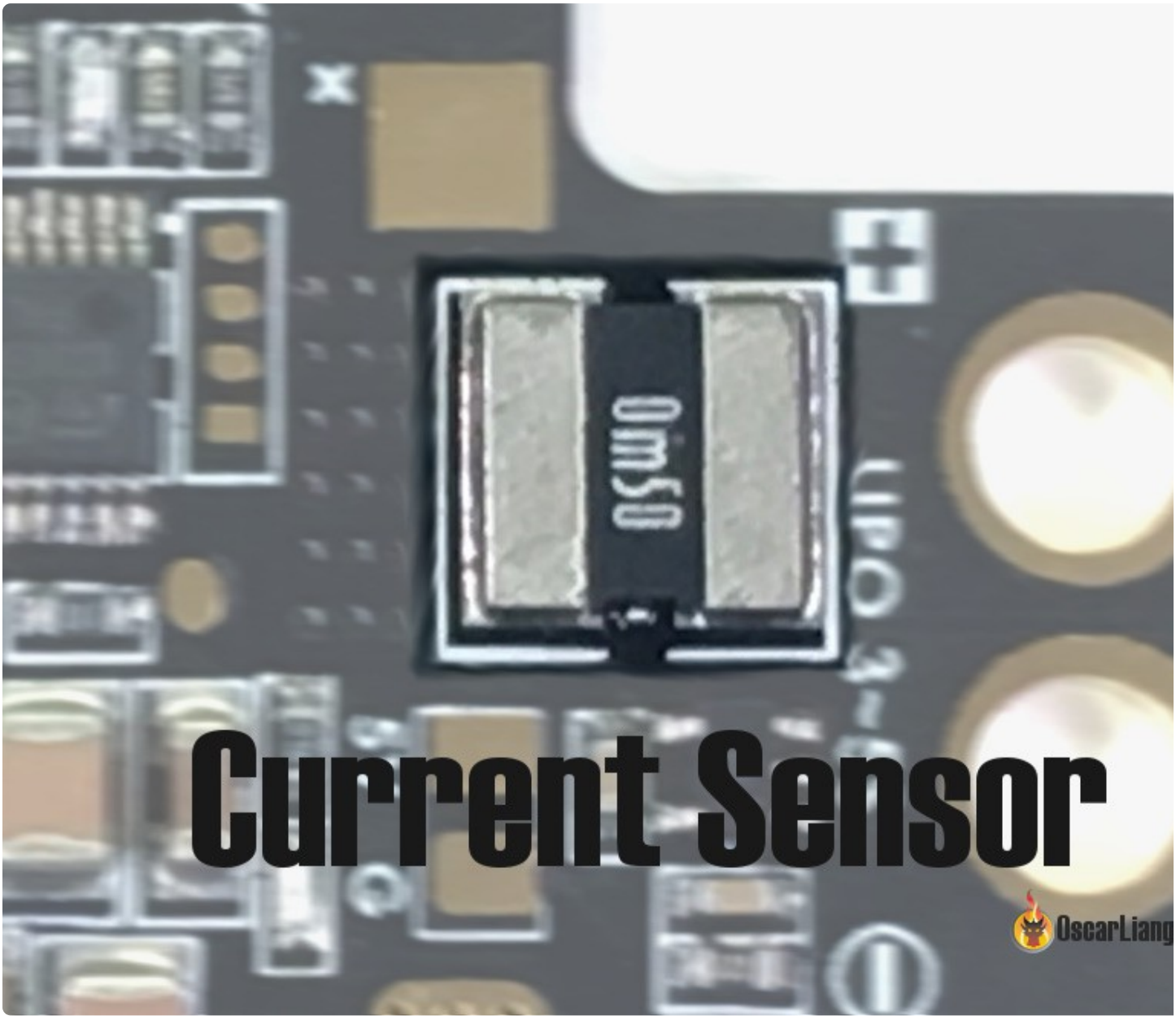
Current Sensor and Calibration

Published: 8th April 2017 | **Last Updated on** 10th February 2020



Current sensor is often used in multirotors to monitor real-time current draw and capacity consumption flight in OSD or Telemetry. In this article we will discuss the benefits of current sensor and how alib get more accurate readings.

COUPON CODES AVAILABLE GET C

Benefits of Current Sensor

has been used are very useful.

med") tells you directly when your battery is depleted.
than voltage (VBAT) which sags with throttle

d and should be retired – if voltage is reaching 3.5V fr
original capacity, then you know the pack is getting ol

f different motor and propeller combinations in real flig

ntroller

- External current sensor that connects between your battery and PDB

For mini quad builds, I don't recommend external current sensor, which are heavy and large in size. Th probably more suitable for larger builds like a 450. FC ro PDB with integrated current sensor and OSD becoming popular for tight builds like mini quads.

Virtual Current Sensor

Virtual current sensor is a feature in Cleanflight and Betaflight. It doesn't require any of the cur sen

Tutorial: http://intofpv.com/t-virtual-current-sensor-with-cleanflight-betaflight

Wrong Current Readings? Calibrate it!

Current sensors are useful, however sometimes these current sensors are not calibrated in the factory identical current sensors could give you slightly different results, therefore it's important that you know calibrate them

If the data of current sensor is not correct, then there is no point of having a current sensor at all. So y should calibrate it.

Current sensors use a simple equation to allow users to adjust/calibrate the output:

e values, and this is what makes current sensor calibr
d to change the offset and you can just leave it at defa
ally is the scale parameter.

ensor

ensors.

This is my "go-to" way of current sensor calibration. It's much safer, and doesn't require any additional equipment. However it can take a little longer to get it done.

Basically, you just need to fly a battery, write down what "mAh consumed" is in your OSD. Then charge battery and see how much capacity is put back. Using this formula you can calculate the new current s scale:

You might need to repeat this process some more times to get an accurate result.

Note that the current scale in Betaflight works backwards, i.e. to make the current sensor read lower, y need to increase scale. For example, if the OSD is reading 10% too high, we need to INCREASE the s 10%, this will make the OSD to read 10% lower… I know, it's confusing :)

Let me give you an example in Betaflight:

- You fly a battery with your quad, and at the end of the flight, Betaflight OSD shows 1100mAh drav
- When you fully re-charge the battery the charger shows 1000mAh was put back into the battery
- Now you get to calculate the new scale value: New scale = Old scale x (1100/1000)
- If the old scale was 400, the new scale would be 400*1.1 = 440

nd offset values for your current sensor. You need to st o the quad so you can measure the actual voltage and

re do this at your own risk. You can make it safer b spin up but down.

in with: https://oscarliang.com/turnigy-7in1-mega-watt-

I found it more reliable to use the motor tab in Betaflight to spin up the motors. You can use your radio transmitter to arm your quad and throttle up, but when PID controller is active, motors speed tend change constantly which can affect the accuracy of your current readings. Motor tab gives you a more reading.

Compare the data from the power meter to the data from the OSD.

First you are going to notice there is small current draw when the motors are idle, that's normal becaus

possible. Normally, offset at 0 works for most current sensors I have come across with.

Now spin up the motors and you are going to notice a high current draw. Aim for a whole amp value or power meter, such as 30A.

If you get a higher or lower value on the OSD, you should adjust the scale. Change it by a small amou first to see how much it affect the result.

For example if you get 35A on your OSD, increase the scale by +50, and now you get 27A in the OSD and you know if by raising scale, you could decrease the reading. And we can work out the proportion between the current and scale: (27-35)/50 = -0.16A, for every scale increment.

In this example, we are still 3A lower than the expected value, so we know we need to lower the scale

r

Review: Superlight 4R Frame from
Machir

LEAVE A COMMENT

Your Comment

Sign me up for the newsletter!

for moderation before appearing.

SUBMIT

31 COMMENTS

JAKO

16th March 2022 - 1:46 am

Hello Oscar! Thanks for the article. Been calibrating my 7 inch for a while but I'm constantly
the scale or lowering..never satisfied. But than I noticed, that until I don't arm the quad, the
stays on 0! But ofcourse it is consuming, vtx, camera, gps…So until I wait to get gps fix it s
ut it is 0. It is just a bug(bf 4.2) or should I play with the
d shows 3000 but in reality I used 3200, and sometime
his normal? It is a Mamba stack f405 mk3.

ht/betaflight/blob/master/docs/Battery.md
rage_meter_scale * (mAh_recharged /

An amount recharged of 1500 mAh
A Cleanflight reported current drawn of 2000 mAh
An existing amperage_meter_scale value of 400 (the default)
Then the updated amperage_meter_scale is:
amperage_meter_scale = old_amperage_meter_scale * (mAh_recharged / cleanflight_reported_mAh_drawn)
= 400 * (1500 / 2000)

THOMAS

15th September 2020 - 4:40 pm

I have tested whit an Tyro79 Virtual Current Sensor:
Scale: 400 / used 444 / recharged 334 = new scale 334
control test:
Scale:301 / used 304 / recharged 307 = new scale 304
Our formula is wrong! I used this: old_amperage_meter_scale * (mAh_recharged / cleanflight_reported_mAh_drawn)
(Tyro whit Betaflight 4.2)

v_scale = old_scale x (OSD_mAh_consumed / mAh_c
n_charged / OSD_mAh_consumed) (Github)

have three quads that I have calibrated the current ser
e wants to be special. When I plug the battery in disar
with the offset but it didnt seem to change anything. I
the scale set to 13,000 and it still says that its running 2a before arming. Is this a sign of a s
gone wrong?

LUKE PERRY

14th March 2019 - 6:36 pm

left of the current sensor not just to the pad it was supposed to go on to, but it soldered dire the side of the current sensor, im guessing this will still be ok? or have a made a grande mi

MAORI

8th March 2019 - 10:26 pm

My mAh going up and up as soon o plug ThE battery, no matter if it calibrated or not. Im us aikon f4 FC and current sensor from matek pdb. If iuse multishot mAh reads are correct . W dshot not. Any idea?

DANNY

23rd February 2019 - 3:53 pm

st and Power Meter" without any Props on the motors, e props on in any case?

ADAM

15th December 2018 - 10:46 am

My used mah is over 1000 when my battery used is only 350. How do I actually adjust it so accurately in my osd?

OSCAR

Calibrate it?

New scale = Old scale x (1000/350)

Then repoeat the process until you are happy with the result.

ADAM

11th January 2019 - 11:52 am

Sorry, what scale or value am I changing in betaflight?

MICHEL PAPON

6th December 2018 - 4:22 pm

Hi O

of my PDB instead of the one of my F4PRO-V2, but v

verride the built-in current sensor in the flight controller

the MCU. Unless your FC has allows external current

22nd November 2018 - 3:06 pm

Hey, hope you can help me out. I have a hobbywing xrotor 45a esc which has a current sen and a OMNIBUS F4 Nano v6 with LC filter which supports Telemetry. Can I connect the wir the esc current sensor to the flight controller telemetry and still get current sensing. Thanks

AL

please answer this,.. I got the hobbywing xrotor g2 stack with xrotor micro 45a esc cant get esc sensor to work even though its in the breakout cable that plugs from e fc..

JOHN

2nd November 2018 - 7:58 pm

Hi – what is considered to be to high of an amp draw? Trying to get a good motor prop com

100TU

17th August 2018 - 7:01 pm

Hi

Ah is increasing when putting the batterie with no thro no relation with flying or not… You linear method does nks

ther troubleshoot:

28th May 2018 - 12:13 am

Man you cover all topics in quad universe!:D love it <3

ABUTALIB

22nd May 2018 - 2:20 am

Hi

terminal would this affect the other wirings ?

Thanks

OSCAR

22nd May 2018 - 3:44 pm

no, it won't affect anything, you can just leave it if you don't want to use it.

ABUTALIB

23rd May 2018 - 4:18 am

appreciated, thanks the informative blogs.

new_scale : mAh_charged

ale x OSD_mAh_consumed

ged / OSD_mAh_consumed)

31st May 2018 - 2:43 am

This formula can't be correct, at least not with Betaflight.

If the current measurement is too high, you have to increase the scale value. Usin formula would decrease the scale. The example by Oscar shows it the right way.

My guess is, that this is different to Cleanflight. Their documentation shows your fo as correct.

31st December 2018 - 11:47 am

I agree, Peter. The correct formula is scale x actual mAh / estimated mAh.

BRAGEE

13th March 2018 - 11:48 am

/QUOTE

• Fly a fully charged LiPo pack and land when “mAh consumed” reaches a whole number, f

example 1000mah or 1200mah or 1400mah…

/UNQUOTE

Dear Oscar,

do you think is really necessary to land the quad when a whole number is reached?

capacity of the battery, any value is good for calculatic

etc..

n I somehow wrong?

ustive article and forgive me if my question is silly…

ge sharing blog. In fact, I could calibrate precisely the

Typhoon32 4 in 1 4 X 35A ESC connected to the OMNIBUS PRO F4 V5. With the soft metl

obtained 230 to put on the Betaflight onboard current sensor tab..

Best reguards

Benoit

BRENDEN

17th January 2018 - 6:21 pm

VIES

16th September 2017 - 12:32 am

By the way, for Matek FCHUB-6S the scale value specified in documentation.
mateksys.com/?portfolio=fchub-6s

STEVEN

1st September 2017 - 1:39 am

Okay I have wraith esc they have current sensing and matek fchub 6 w current sensing an
I connect my swift w osd to flight controller because it has filtering for camera or do I have t
connect to pdb to use current sensing capabilities?

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